**Chapter 8: Language**

**Learning Objectives**

* Describe the defining features of language.
* Contrast the concepts of semantics, syntax, and pragmatics.
* Discuss how Broca’s area and Wernicke’s area in the left hemisphere support the use of lan­guage.
* Describe dual pathway models of word recognition and how conceptually driven pattern recog­nition aids the process.
* Explain why speed reading is best understood as trained skimming.

**Chapter 8: Language**

**Brief Summary**

Language is a symbolic system used to communicate ideas among two or more individuals. It consists of phonological segments, known as phonemes, that are the building blocks of meaningful segments known as morphemes. A set of grammatical rules, known as syntax, determines how morphemes are arranged into meaningful sentences. The use of language among humans dates back approximately 150,000 to 200,000 years ago. The origins of language are much debated among theorists. One idea suggests that vocal language evolved together with gestural communication. A second idea suggests that language evolved simultaneously with increased brain size. Human communication differs from animal communication in three specific ways: 1) it uses symbols to represent objects, 2) it involves a theory of mind, and 3) it is productive or has the capacity to generate novel sentences. An important consideration in the study of language is understanding the relationship between cognitive processes and how language is represented in the mind. The theory of universal grammar suggests that knowledge of human language is innate or hard-wired into the brain such that there exists a critical period of time, early in development, for optimally acquiring language. Within the brain, language is lateralized to the left hemisphere with separate regions controlling the production and comprehension of language. Broca’s area, located in the left frontal lobe, is responsible for language production, whereas Wernicke’s area, located in the left temporal lobe, is responsible for language comprehension.

Language comprehension is a complex cognitive process and involves building mental structures starting at the local level of words and proceeding to global units found in extended discourse. Building these mental structures involves word recognition, which uses both bottom-up and top-down processes to covert graphemes to phonemes, and sentence comprehension, which relies on inferences to interpret the meaning of the words. Discourse comprehension occurs when the references in each sentence are locally coherent with one another and when the sentences can be fit into a global framework of causes and effects. Reading speed, typically about 250-300 words per minute, is constrained by perceptual factors in fixating the text and cognitive factors in building mental structures. Fixation, or the length of time the eyes remain on a word or part of a word, is linked with comprehension. The immediacy assumption holds that readers assign an interpretation to each word as it is fixated. The eye-mind assumption holds that the duration of fixation varies with the amount of information that must be processed in working memory at that instant. Dyslexia, which afflicts 5-10% of children in the primary grades in the United States, refers to an impairment in the ability to recognize printed words. Recent research suggests that dyslexia may be due to a phonological deficit that impairs the ability to convert graphemes into phonemes. Tanaka et al. (2011) found that reduced activation of brain regions responsible for phonological processing, independent of IQ, characterized the performance of poor readers. These results suggest that training phonological awareness would be helpful to any poor readers.

**NOTE- If any of the links contained within are not working, please contact the publisher and an alternate resource will be found for you. In addition, an updated Chapter to this instructor’s manual will be uploaded to the companion website.**

**Chapter 8: Language**

**Detailed Summary**

1. Language is a system of symbols that are used to communicate ideas between two or more individuals. It uses both mental and external representations, such as printed text. Language uses arbitrary symbols that refer to events displaced in time and space. The mental lexicon and grammar of a language are productive, allowing one to generate an infinite number of novel sentences. A language must be learnable by children, it must be able to be spoken and understood readily by adults, it must capture the ideas that people normally communicate, and it must enable communication among groups of people in a social and cultural context. All human languages make use of 50 or so speech sounds or phonological segments produced by our vocal apparatus. Each such utterance is a phoneme, defined as a basic speech sound that makes a difference in meaning. A morpheme is a minimal unit of speech used repeatedly in a language to code a specific meaning; it is made up of two or more phonemes, such as a word or a suffix.

2. Languages differ in terms of their semantics, syntax, and pragmatics. Semantics concerns the use of symbols to refer to objects, events, and ideas in the world. The words used in language make up the lexicon that must be represented mentally in fluent speakers. Syntax concerns the grammatical rules for ordering words to construct meaningful and acceptable sentences in a language. Pragmatics concerns the use of language within social contexts. People command, inform, warn, and otherwise communicate their intentions as direct speech acts (e.g., “Open the window.”) or as indirect speech acts (e.g., “Dreadfully hot in here, don’t you think?”). An implicit agreement, called the cooperative principle, governs conversations to ensure that participants say appropriate things and end the conversation at a mutually agreeable point.

3. Universal grammar refers to the genetically determined knowledge of human language that allows children in all cultures to rapidly acquire the language to which they are exposed. The question of whether or not language is innate has been hotly debated and remains unresolved. Language is localized in the left hemisphere of virtually all right-handed individuals. Damage to Broca’s area in the left hemisphere causes a language disorder or aphasia. Broca’s aphasia refers to an inability to speak fluently without effort and with correct grammar. By contrast, damage to Wernicke’s area disrupts language comprehension. Speech is fluent and effortless in Wernicke’s aphasia, although it is often semantically meaningless.

4. Text comprehension (i.e., reading) has been investigated much more extensively than has writing. The theme of cognition as active construction is well illustrated by the processes of reading. The reader builds mental structures at the local level of micropropositions expressed in words and sentences as well as at the global or macropropositional level of paragraphs and discourse. Sentences possess referential coherence when the words and phrases of one sentence refer unambiguously to those of other sentences in the same paragraph. In building mental structures, the reader uses more than the literal words on the page. For example, the readers use their knowledge about the world to make plausible bridging inferences during comprehension.

5. Normal reading speed is about 250 to 300 words per minute. This rate is constrained by the perceptual factors in fixating on the text and the cognitive factors in building mental structures. The reader appears to assign an interpretation to words, including ambiguous ones, as soon as they are encountered. The amount of time spent fixating on a word corresponds with the difficulty encountered in processing and assigning an interpretation to it.

**Chapter 8: Language**

**Topical Outline**

Defining Language

* Language is a system of symbols that are used to communicate ideas among two or more individuals.

Origins of Language

* + Theories concerning the origins of language consider language to have evolved from gestural communication and as a consequence of the large brain of human beings.

Meaning, Structure, and Use

Semantics

* + Semantics is the study of meaning.
  + A morpheme is a minimal unit of speech used repeatedly in a language to code a specific meaning.
  + Phonemes are the phonological segments that distinguish one meaningful word from another.
  + All morphemes in a language make up a mental lexicon or dictionary of long-term memory on which human beings rely when speaking and listening and when reading and writing.

Sound Structure

o The sound structure of a language includes its phonology and the variations in syllable stress, tone, and intonation that occur across words, phrases, and whole sentences.

Syntax

* The grammatical rules that specify how words and other morphemes are arranged to yield acceptable sentences.

Pragmatics

* Pragmatics refers to the manner in which speakers communicate their intentions depending on the social context.
* Speech acts serve to express a speaker’s intention in a way that the listener will recognize.
* Conversations are governed by an implicit contractual agreement between the speakers known as the cooperative principle in which the participants agree to say things appropriate to the conversation and to end the conversation at a mutually agreeable point.

Contrasts to Animal Communication

* Human communication differs from animal communication in terms of its use of symbols to represent objects, its involvement of a theory of mind, and its use of productivity or the ability to generate novel sentences.

Representations of Language

* It is important to understand the relationship between cognitive processes and how language is represented in the mind.

Universal Grammar

* Universal grammar refers to the hypothesis that genetically determined knowledge of human language allows children in all cultures to rapidly acquire the language to which they are exposed.

Parameter Setting

* + An innate language acquisition device guides children toward selecting the proper syntactic word order that matches their natural language.

Absence of Input

* + The case of a universal grammar and a critical period for language acquisition are supported by studies of congenitally deaf children and feral children.

Neural Systems

* + Studies of neuroanatomy indicate that language functions are localized to specific regions of the brain.
  + Broca’s aphasia refers to an inability to speak fluently without effort and with correct grammar.
  + Wernicke’s aphasia refers to a language comprehension dysfunction characterized by speech that is fluently effortless, yet semantically meaningless.

Semantic Versus Phonological Storage

* Separate brain regions mediate the semantic and phonological storage of words.

Laterality

* Hemispheric dominance or brain lateralization in human beings means that one hemisphere controls key motor and cognitive functions.

Comprehension of Language

* Language comprehension involves building mental structures starting at the local level of words and proceeding to global units found in extended discourse.

Word Recognition

* + The process of word recognition involves both data-driven and top-down processes.
  + The recognition of written words requires conversion from graphemes to phonemes as well as retrieval of word information from the phonological and orthographic lexicons.

Sentence Comprehension

* + Sentence comprehension is made complex by the cognitive processes readers must engage in to interpret the assertions being made and whether the voice is active or passive.

Bridging Inferences

* + - Anaphora is a word used to substitute for a previous word or phrase.

Given-New Strategy

* + - The given-new strategy in readers assumes that writers mark information already understood and information meant to be a new assertion.

Polsemy

* + - Polysemy is the property of language that a single word can have more than one meaning.

Discourse Comprehension

* + Discourse comprehension occurs when the references in each sentence are locally coherent with one another and when the sentences can be fit into a global framework of causes and effects.

Referential Coherence

* + - Referential coherence is when the words and phrases of one sentence in a paragraph refer unambiguously to those of other sentences in the paragraph.

Global Frameworks

* + - A global framework of a text consists of micropropositions that express individual propositions and macropropositions that are schema-based generalizations that summarize the main ideas or gist of the text.

Reading

* Literacy involves both reading and writing.
* Progress in understanding writing in cognitive psychology has been slow compared to reading due to the more serious demands on thinking and language skills required by writing.

Speed Versus Comprehension

* Reading speed, typically about 250-300 words per minute, is constrained by perceptual factors in fixating the text and cognitive factors in building mental structures.
* The immediacy assumption holds that readers assigns an interpretation to each word as it is fixated.
* The eye-mind assumption holds that the duration of fixation varies with the amount of information that must be processed in working memory at that instant.

Dyslexia

* Dyslexia refers to an impairment in the ability to recognize printed words. It can appear developmentally or can be acquired in adulthood from injury to the brain.
* Tanaka et al. (2011) found that both discrepant readers (those with IQs in the normal range) and nondiscrepant readers (those with IQs below the normal range) displayed reduced activation in the brain regions responsible for phonological processing compared to normal readers.

**Chapter 8: Language**

**Key Terms**

semantics

morpheme

mental lexicon

syntax

pragmatics

speech act

cooperative principle

productivity

universal grammar

Broca’s aphasia

Wernicke’s aphasia

brain lateralization

corpus callosum

graphemes

anaphora

given-new strategy

bridging inferences

polysemy

referential coherence

micropropositions

macropropositions

immediacy assumption

eye-mind assumption

dyslexia

**Chapter 8: Language**

**Discussion Questions**

Discussion Question #1

Your guard dog can execute a range of verbal commands and can take decisive action against intruders in your absence. Based on the material in this chapter, would your interactions with your guard dog constitute language? Why or why not?

Discussion Question #2

Discuss the pros and cons of the existence of a critical period for language acquisition. What possibilities are there for extending this critical period?

Discussion Question #3

Research demonstrates that young children can comprehend a far greater number of words than they can produce. Discuss the reasons for why comprehension of words may be easier for young children than the production of words and identify the specific brain areas that are primarily involved in these processes.

Discussion Question #4

Provide one example each of how memory contributes to language and how language contributes to memory. How does the interconnection between language and memory contribute to “higher-order” cognition?

Discussion Question #5

Explain how music might be considered a language by providing examples of how music uses semantics, sound structure, syntax, and pragmatics.

**Chapter 8: Language**

**Questions for Thought**

Record a 5-minute conversation with a friend and then listen to the recording. Are the utterances grammatically correct sentences, or are they largely telegraphic or fragmented? In what ways does the conversation illustrate the cooperative principle and pragmatics?

In reading this chapter, in what specific places did you need to make bridging inferences? Did you need to pause or go back and reread the previous sentence or two at these points? Describe some of the micropropositions asserted in the text. What are some of the macropropositions that convey the basic gist of the chapter?

Consider learning a second language as a college student. In what ways are your utterances in a foreign tongue similar to those of a patient with Broca’s aphasia? How are your comprehension and production similar to those of a patient with Wernicke’s aphasia?

**Chapter 8: Language**

**Web Resources**

[**Aphasia Quiz**](http://www.aphasia.org/content/aphasia-quiz-0)

National Aphasia Association’s quiz on aphasia

[**Primate Use of Language**](http://www.pigeon.psy.tufts.edu/psych26/language.htm)

A web page discussing language use in primates.

[**The Brain – Language and Speech, Broca’s and Wernicke’s Area**](https://www.youtube.com/watch?v=5k8JwC1L9_k)

A video on Broca’s and Wernicke’s areas.

[**1973 - Teaching Sign Language to Chimpanzees**](https://www.youtube.com/watch?v=WbdEy-E4xEk)

A video demonstrating how to teach sign language to chimpanzees.

[**ELIZA**](http://www-ai.ijs.si/eliza-cgi-bin/eliza_script)

An interactive demonstration of human-computer interaction with ELIZA, one of the earliest attempts at artificial intelligence.

[**Sentence Memory: Inferences**](http://courses.missouristate.edu/timothybender/mem/mydemos.html#recent)

Click on “Recent Demonstrations” and scroll down the page to “Sentence Memory: Inferences” for an interactive demonstration based on Bransford, Barclay, and Franks’ (1972) experiment on memory for sentences.

**Chapter 8: Language**

**SAGE Journal Articles**

Kilger, S. (1971). [The grand illusion in teaching language.](http://rel.sagepub.com/cgi/reprint/2/2/68?ijkey=5Bq.mPiRswt5M&keytype=ref&siteid=sprel) RELC, 2, 68-79.

1. The author discusses a mechanism known as the language acquisition device or LAD. What is the function of the LAD?
2. How does the author distinguish between the concepts of deep structure and surface structure?
3. How is chunking related to learning language?
4. According to the author, how does transformational theory provide a model for teaching language?

Urquhart, C. (1979). [Reading, looking, and learning](http://jis.sagepub.com/cgi/reprint/1/6/333?ijkey=KObay/JMzkrqU&keytype=ref&siteid=spjis). Journal of Information Science, 1, 333-344.

1. What are the properties of printed language that are considered by the author to

influence the reading process?

2. How do a reader’s expectations aid text comprehension?

3. In the article, the author reviews research on techniques designed to increase reading speed. According to the author, what evidence is there against the effectiveness of methods used to improve reading speed? What factor does the author suggest as important for success at becoming a speed reader?

**Chapter 8: Language**

**Recommended Readings**

Clark, H. H. (1996). *Using language.* Cambridge, UK: Cambridge University Press.

Christiansen, M. H., & Kirby, S. (2003) Language evolution: Consensus and controversies. *Trends in Cognitive Sciences, 7,* 300–307.

Gernsbacher, M. A., & Kaschak, M. P. (2003). Neuroimaging studies of language production and comprehension. *Annual Review of Psychology*, 54, 91-114.

Martin, R. C. (2003). Language processing: Functional organization and neuroanatomical basis. *Annual Review of Psychology*, 54, 55-89.

Pennebaker, J. W., Mehl, M. R., & Niederhoffer, K. G. (2003). Psychological aspects of natural language use: Our words, our selves. *Annual Review of Psychology*, 54, 547-577.

Seyfarth, R. M., & Cheney, D. L. (2003). Signalers and receivers in animal communication. *Annual Review of Psychology*, 54, 145-173.

Tomasello, M. (2008). *Origins of human communication.* Cambridge, MA: MIT Press.